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EXAMINER	
HALL, ASHA J	

ART UNIT	PAPER NUMBER
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/762,479	KIM ET AL.	
	Examiner	Art Unit	
	Asha Hall	1753	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 July 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-5 and 7* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-5 and 7* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. Claims 1-7 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. With respect to the amended subject matter in claim 1, "the counter electrode contacting the light absorbing dye" is not described in the specification or depicted in the drawings. The specification discloses the method for fabricating a counter electrode for a dye sensitized solar cell, but fails to disclose the counter electrode in contact with a light absorbing dye.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1, 2, and 5 rejected under 35 U.S.C. 102(b) as being anticipated by Park et al. (K.W. Park, K.S. Ahn, J.H. Choi, Y.C. Nah, Y.M. Kim, "Pt-WO_x electrode structure for thin-film fuel cells," Applied Physics Letters 81, (2002) 907-909).

As to claim 1, Park et al. disclose a method for fabricating a counter electrode (Pt-WO_x two-phase electrode, paragraph 2) the method comprising: co-sputtering platinum (Pt target material, paragraph 3) and a metal oxide (WO_3 target material, paragraph 3) as target materials onto a substrate (ITO coated transparent glass substrate, paragraph 3) as described in paragraph 3. The process forms a counter electrode (Pt-WO_x nanostructured alloy electrode, paragraph 2) that includes nanocrystalline platinum (nanosized Pt crystalline phase of 4-5 nm shown as the dark portions of the images in Figure 1 and discussed in paragraph 4). Finally, the method disclosed by Park et al. yields an amorphous metal oxide (amorphous, porous tungsten oxidative phase discussed in paragraph 4 and shown as the "relatively bright region" in the TEM image of the electrode in Figure 1). Park et al. further discloses that the counter electrode has a two-phase structure consisting of Pt metal and a porous/open structure metal oxide (WO_x) such that it is a two phase structure composed of a nano-crystalline and an amorphous phase/non-layered structure (p.908, paragraph 1) as shown in Figure 1.

Although the method disclosed in Park et al. is for the fabrication of an electrode for a Thin-film fuel cells and not explicitly for a dye-sensitized solar cell, the method disclosed provides an electrode suitable for the latter device without any modifications whatsoever. This preamble merely recites the purpose of the process and the intended use of the resulting structure, while the body of the claim does not depend on the preamble for completeness and the process steps and structural limitations are able to stand alone (see MPEP 2112.02).

As to claim 2, the metal oxide of Park et al. (i.e., amorphous tungsten oxide) has a refractive index of 2 or higher. This is evidenced by Gogova et al. . (D. Gogva, K. Gesheva, A. Szekeres and M. Sendova-Vassileva, "Structural and Optical Properties of CVD Thin Tungsten Oxide Films, " Physica Status Solidi (a) 176 (2) , (1999) 969 - 984) in Figure 8 (see refractive index for amorphous tungsten oxide unannealed and deposited at 200°C).

As to claim 5, the metal oxide of Park et al., i.e., amorphous tungsten oxide, has an open or porous structure (see the description of , "an amorphous, porous tungsten oxidative phase" in paragraph 4).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 1 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pruneanu et al. (S. Pruneanu, G. Mihailescu, E. Indrea, "Nanoporous Al_2O_3 membranes filled by platinum," Semiconductor Conference 2000, CAS 2000 Proceedings, International 2, (2000) 475-478) in view of Park et al.

As to claims 1, Pruneanu et al. disclose a method for fashioning an Al_2O_3/Pt composite "nanoelectrode" counter electrode for "electronic and photoelectronic devices" such as dye-sensitized solar cells (Introduction, paragraph 1). The method

involves depositing the counter electrode/ Pt metal inside nanopores of Al_2O_3 electrochemically which creates nanocrystalline patches/nanoporous membranes/non-layered (p.476, paragraph 3) of Pt metal for the electrode. What Pruneanu et al. fail to disclose is a technique based on sputtering.

Park et al. disclose a method for fabricating a counter electrode (Pt-WO_x two-phase electrode, paragraph 2) the method comprising: co-sputtering platinum (Pt target material, paragraph 3) and a metal oxide (WO_3 target material, paragraph 3) as target materials onto a substrate (ITO coated transparent glass substrate, paragraph 3) as described in paragraph 3. The process forms a counter electrode (Pt-WO_x nanostructured alloy electrode, paragraph 2) that includes nanocrystalline platinum (nanosized Pt crystalline phase of 4-5 nm shown as the dark portions of the images in Figure 1 and discussed in paragraph 4). Finally, the method disclosed by Park et al. yields an amorphous metal oxide (amorphous, porous tungsten oxidative phase discussed in paragraph 4 and shown as the "relatively bright region" in the TEM image of the electrode in Figure 1). Park et al. explain, in paragraph 1, that such a sputtering process produces electrodes "physical and electrochemical properties" that are superior relative to other techniques. As to the latter, Park et al. specifically mention an "electrochemical deposition" similar to that used by Pruneanu et al. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the method of Pruneanu et al. for creating a Al_2O_3/Pt electrodes by doing the same using the sputtering method of Park et al. in order to improve the physical and electrochemical properties of the electrode.

Although the method disclosed in Park et al. is for the fabrication of an electrode for a Thin-film fuel cells and not explicitly for a dye-sensitized solar cell, the method disclosed provides an electrode suitable for the latter device without any modifications whatsoever. In fact, the explicit mention of the use of the method disclosed in the instant application for a dye-sensitized solar is simply part of the preamble of the claim which is generally not accorded any patentable weight. This preamble merely recites the purpose of the process and the intended use of the resulting structure, while the body of the claim does not depend on the preamble for completeness and the process steps and structural limitations are able to stand alone (see MPEP 2112.02).

As to claim 7, the metal oxide of Pruneanu et al. is Al_2O_3 which is an oxide of aluminum.

6. Claims 3 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Park et al. in view of Vink et al. (T.J. Vink, W. Walrave, J.L.C. Daams, P.C. Baarslag, J.E.A.M. van den Meerakker, "On the homogeneity of sputter-deposited ITO films Part I. Stress and microstructure," Thin Solid Films 266 (1995) 145-151).

As to claims 3, the reference Park et al. discloses all the features of claims 1 and 8 above but fails to provide a metal oxide layer selected from oxides of titanium, chromium, zinc, copper, ruthenium, vanadium, tin and indium.

Vink et al. disclose a sputtering method (paragraph 1 of the Experimental section) that uses two metal-oxide targets and is entirely compatible with that of Park et al. for sputter-depositing films for use in optoelectronic applications as a transparent conductor (Introduction, 1st paragraph). Neerinck et al. explain the advantages using

the method to sputter-deposit amorphous films of indium tin oxide (low-temperature, LT, deposited amorphous ITO films) that have relatively low resistivity and high transmissivity to visible light (Introduction, 1st paragraph). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the method of Park et al. by using the method of Vink et al. (i.e., by using the two metal oxide targets of Neerick et al. to sputter-deposit indium tin oxide) in order to decrease the resistivity and increase the transmissivity of the electrode. Doing so would form a counter-electrode that would include nanocyrstalline platinum as well as an amorphous metal oxide layer composed of oxides of both tin and indium.

As to claim 4, the metal oxide of Vink et al. has an electrical resistivity of less than 10^{-2} Ω cm (Figure 1), which implies conductivity well in excess of 0.1 S/m.

Response to Arguments

Claim Objections

1. Due to Applicant's canceling claims 6 and 13, the objection to the claims 6 and 13 are no longer applicable.

Claim Rejection under 35 USC §112

2. Due to Applicant's amendments, the 35 USC § 112 2nd paragraph rejection for claim 7 is withdrawn.

Claim Rejection under 35 USC §102

3. All arguments are directed toward the claims 1, and dependants 2 and 5 as amended. Such amendments require new grounds of rejection presented above.

Claim Rejection under 35 USC §103

4. All arguments are directed toward the claims 1, and dependants 3,4, and 7 as amended. Such amendments require new grounds of rejection presented above

Conclusion

5. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Asha Hall whose telephone number is 571-272-9812. The examiner can normally be reached on Monday-Thursday 8:30-7:00PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alexa Neckel can be reached on 571-272-1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

AJH

ALEXA D. NECKEL
SUPERVISORY PATENT EXAMINER